WHAT IS CLAIMED IS:

1. A purified or isolated nucleic acid comprising a sequence that encodes a peptide loop corresponding to amino acid residues 136-216 of wild-type IRP-2 from humans, wherein said sequence comprises a mutation in said peptide loop, wherein said mutation interferes with the ability of a cysteine residue present in said peptide loop to undergo oxidation.

2. The purified or isolated nucleic acid of Claim 1, wherein said nucleic acid sequence comprises at least one of **SEQ. ID Nos. 3, 5, 7, 9, 11, 13, and 15.**

3. The purified or isolated nucleic acid of Claim 1, wherein said nucleic acid sequence encodes a peptide comprising a sequence selected from the group consisting of **SEQ. ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

4. A purified or isolated polypeptide comprising a peptide loop corresponding to amino acid residues 136-216 of wild-type IRP-2 from humans, wherein said sequence comprises a mutation in said peptide loop, wherein said mutation interferes with the ability of a cysteine residue present in said peptide loop to undergo oxidation.

5. The purified or isolated polypeptide of Claim 4, wherein said IRP-2 protein comprises a sequence selected from the group consisting of **SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

6. The purified or isolated polypeptide of Claim 4, wherein said IRP-2 protein is selected from the group consisting of **SEQ. ID. Nos. SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

7. A method of identifying a subject in need of treatment or prevention of a neurodegenerative disease comprising:

obtaining a biological sample from said subject having polynucleotides or protein;

providing a probe, said probe being selected from the group consisting of a probe that interacts with a wild type or mutant IRP-2 protein and a probe that interacts with a polynucleotide encoding a wild type or mutant IRP-2 protein;

contacting the biological sample with the probe under conditions that allow the probe to interact with the polynucleotide or protein in the biological sample;

detecting the amount of probe that interacts with the polynucleotide or protein in the biological sample; and

identifying the subject as a subject in need of treatment or prevention of neurodegenerative disease by determining the presence or absence of the probe with the polynucleotide or protein in the biological sample.

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8. The method of Claim 7, wherein the probe is selected from the group consisting of a nucleic acid, a protein, and a peptidomimetic.

9. The method of Claim 7, wherein the detection of the amount of probe that interacts with the polynucleotide or protein comprises use of a technique selected from the group consisting of fluorescence-activated cell sorting (FACs), immunoprecipitation, Western blot, immunochromatography, antibody staining, and a hybridization assay.

10. The method of Claim 7, wherein the neurodegenerative disease is Alzheimer's disease.

11. A method of making a probe for the diagnosis of a neurodegenerative disease comprising:

providing a polypeptide according to Claim 4; and

generating an antibody that binds to an epitope present on said mutant polypeptide, wherein said antibody does not cross react with a wild-type IRP-2 protein or fragment thereof.

12. The method of Claim 11, wherein said mutant comprises a substitution or a deletion of a cysteine residue.

13. The method of Claim 11, wherein the generating step comprises culturing cells which produce said antibody.

14. An antibody capable of specifically binding to a protein comprising an amino acid sequence selected from the group consisting of **SEQ ID Nos. 4, 6, 8, 10, 12, 14, and 16.**

15 The antibody of Claim 13, wherein said antibody specifically binds to a polypeptide comprising at least 10 consecutive amino acids of said protein and said protein has a mutation of a cysteine residue.

16 The antibody of Claim 13, wherein the antibody is a monoclonal antibody.

17. A purified or isolated antibody capable of specifically binding a mutant IRP-2 protein but does not specifically bind wild-type IRP-2 protein, wherein said mutant IRP-2 protein comprises a mutation in a peptide loop that corresponds to the amino acid sequence of **SEQ. ID. No. 2.**

18. The method of Claim 7, wherein the identification of the subject as a subject in need of treatment or prevention of neurodegenerative disease comprises determining whether the probe interacts with the polynucleotide or protein in the biological sample.

19. A method of differentiating mild cognitive impairment syndrome (MCI) from other forms of dementia in a human patient, comprising:

conducting magnetic resonance imaging (MRI) on the patient to quantitate and/or monitor brain iron;

wherein abnormal levels or distribution of brain iron indicate the presence of MCI.